LEVEL II

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EVALUATION OF ALTERNATIVE APTITUDE AREA CONVERSION TABLES FOR USE WITH ASVAB 6 AND 7

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PERSONNEL ACCESSION AND UTILIZATION TECHNICAL AREA

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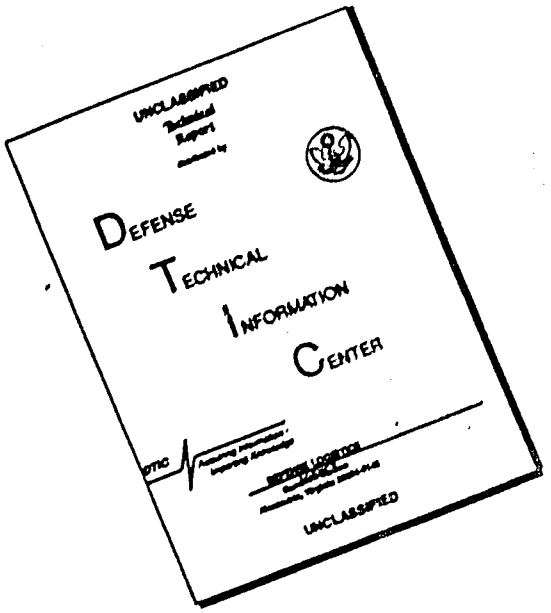

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EVALUATION OF ALTERNATIVE APTITUDE AREA CONVERSION TABLES FOR USE WITH ASVAB 6 AND 7

INTRODUCTION

Applicants for military enlistment are administered an aptitude test battery at the Armed Forces Examining and Entrance Stations (AFEES) or at certain local sites under AFEES auspices. The battery, the Armed Services Vocational Aptitude Battery Form 6 or Form 7 (ASVAB 6/7), consists of 13 subtests which for Army purposes yield 16 scores which are in turn synthesized in various ways to form 11 composite scores. The composite scores are nine aptitude area scores used by the Army and Marine Corps for MOS assignment, a tenth used to identify candidates for certain supplementary tests, and the Armed Forces Qualification Test (AFQT), which is an overall indicator of eligibility.

These 11 composite scores serve two purposes in the Army: (a) to establish enlistment qualification, and (b) to establish eligibility for specific service schools. To qualify for enlistment an applicant with a high school diploma or general educational development (GED) diploma must attain a converted Army Standard score of 90 in at least one aptitude area, and an applicant without a high school diploma (or GED) must attain an Army Standard converted score of 90 in at least two areas. These requirements are in addition to attaining a qualifying AFQT percentile score. After qualifying for enlistment, applicants must qualify for schools, most of which have prerequisites of Army Standard converted scores in specific aptitude areas. Prerequisites vary, but most are in the score range of 85-110.

To calculate the composite scores, raw scores on specific subtests are added together, and the raw sum is referred to conversion tables which show the Army Standard Score or percentile equivalent. It is this converted score which is used for decision purposes in screening and assigning Army applicants.

The current operational conversion tables are based on results of an administration of the test battery to approximately 4,500 applicants for military service in September-October 1975. Air Force Human Resources Laboratory was executive agent for that research, with assistance provided by the laboratories of all of the other services.

An alternative set of ASVAB 6/7 conversion tables has subsequently been developed by the Center for Naval Analyses at the request of the Marine Corps.[1] These alternative conversion tables are based on scores of 3,134 Marine Corps recruits who were administered ASVAB 6/7 at the two Marine Corps Recruit Depots during the period December 1975 - February 1976.

OBJECTIVE

The objective of this analysis was to compare the operational ASVAB conversion tables with the experimental set proposed by the Marine Corps, in order to determine the impact of any possible change in conversion tables upon Army enlistment screening and school assignment.

METHOD

Complete sets of ASVAB 6/7 test scores were available on a sample of Army applicants tested as part of the original ASVAB 6/7 standardization in September-October 1975. Complete sets of scores on the 1973 Army Classification Battery (ACB-73) were also available for this sample. After removal of the small number of women applicants and all applicants who failed the then operational AFQT enlistment standard (16th percentile), 386 remained for analysis.

Complete sets of ASVAB 6/7 test scores were also available on a second sample of AFEES applicants, tested in January 1976. With removal of women and AFQT failures, 657 cases remained for analysis in Sample 2.

After removal of AFQT failures (using the operational conversion tables), the scores in each sample were grouped into three subsamples (again on the basis of the operational conversion tables):

1. Those unquestionably <u>not qualified</u> for enlistment, i.e., no aptitude area score as high as 90;

2. Those unquestionably <u>qualified</u> for enlistment, i.e., two or more aptitude area scores of at least 90;

3. A marginal group who, depending upon their education, might or might not be qualified, i.e., only one aptitude area score of 90. This group was treated separately because educational information was not available.

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[1] Kohn, R. L., and Sims, W. H. An examination of the normalization of the Armed Services Vocational Aptitude Battery (ASVAB) Forms 6 and 7. Center for Naval Analyses (CNA76-3091), 27 July 1976.

RESULTS

ENLISTMENT ELIGIBILITY [2]

Table 1 shows the percentage of Army applicants in each of the two samples, sorted into the categories of unquestionably not qualified, unquestionably qualified, and marginally qualified (as defined above) when using, separately, both operational and experimental conversion tables.

The only apparent differences are very minor. In Sample 1 the experimental conversions would shift a few men from the marginally qualified to the clearly unqualified category, and in Sample 2 would result in a slight shift in the opposite direction--fewer unqualified, fewer marginally qualified, more men clearly qualified.

If these samples are representative, it seems fairly certain that these minute, compensatory changes are merely chance variation and that either set of aptitude area conversions would qualify about the same percentage of applicants for the Army.

ADVANCED INDIVIDUAL TRAINING (AIT) SCHOOL ELIGIBILITY

For the analysis of school eligibility, the data were weighted to a rectangular distribution to conform to the ASVAB normalization procedure. That is, weights were assigned to the men (not scores) in each decile to insure that an equal number of (weighted) men would appear in each decile. This procedure is done before excluding records with AFQT scores lower than 16. Since the passing score of 16 falls within a decile and because there is rounding error, the number of men counted with two or more area aptitude scores of 90 varies slightly from the unweighted number shown in Table 1. The weighting makes the sample more representative of the population and thus the results of the analysis more meaningful.

Table 2 compares the two sets of conversions in terms of school eligibility. Specifically, since a score of 90 is the most common level of aptitude area school prerequisite, Table 2 shows the percentage of men who, after qualifying for the Army, attain a 90 or higher in any given aptitude area. Thus, of the 359 men in Sample 1 who qualified for the Army with two 90's, 307 (85.5%) of them scored 90 or above on the Combat (CO) composite using the operational conversion table, while only 271 (75.5%) of them would have received the same score if the experimental CO conversion table had been used.

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[2] Initial analyses of certain of the enlistment eligibility data were performed by Mr. Steven Gorman, Manpower Plans and Policy Division, Headquarters, USMC; and appreciation is expressed for that assistance.

Table 1

COMPARISON OF ALTERNATIVE ASVAB 6/7 CONVERSION TABLES

Number[a] of Area Aptitude Scores ≥ 90		Number of men			
		ASVAB Operational Conversion		ASVAB Experimental Conversion	
		Number	Percent	Number	Percent
Sample 1:					
Not qual.	0	6	1.6	10	2.6
Marginal	1	26	6.7	22	5.7
Qual.	2-9	354	91.7	354	91.7
	all	386	100.0	386	100.0
Sample 2:					
Not qual.	0	12	1.8	10	1.5
Marginal	1	27	4.1	23	3.5
Qual.	2-9	618	94.1	624	95.0
	all	657	100.0	657	100.0

[a]General Technical (GT) area excluded.

Table 2

APPLICANTS SCORING 90 OR HIGHER ON AT LEAST 2 APTITUDE AREAS AND ATTAINING A SCORE OF 90 OR HIGHER IN SPECIFIC APTITUDE AREAS

	Sample 1[a] (N=359)						Sample 2[a] (N=629)					
	Operational conversion tables		Experimental conversion tables		Difference		Operational conversion tables		Experimental conversion tables		Difference	
Aptitude area	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Combat (CO)	307	85.5	271	75.5	-36	-12	570	90.6	518	82.4	-52	- 9
Field Artillery (FA)	290	80.8	278	77.4	-12	- 4	557	88.6	533	84.7	-24	- 4
Electronics (EL)	313	87.2	294	81.9	-19	- 6	582	92.5	560	89.0	-22	- 4
Operator & Food (OF)	303	84.4	260	72.4	-43	-14	555	88.2	511	81.2	-44	- 8
Surveillance & Communications (SC)	305	85.0	251	69.9	-54	-18	552	87.8	499	79.3	-53	-10
Mechanical Maintenance (MM)	303	84.4	283	78.8	-20	- 7	565	89.8	537	85.4	-28	- 5
General Maintenance (GM)	321	89.4	291	81.1	-30	- 9	593	94.3	542	86.2	-51	- 9
Clerical (CL)	293	81.6	283	78.8	-10	- 3	538	85.5	517	82.2	-21	- 4
Skilled Technical (ST)	310	86.4	299	83.3	-11	- 4	566	90.0	548	87.1	-18	- 3
General Technical (GT)	289	80.5	278	77.4	-11	- 4	552	87.8	532	84.6	-20	- 4
				Average	-25	- 8%				Average	-33	- 6%

[a]Men with AFQT percentile score >15 and at least 2 aptitude area standard scores of 90.

Table 2 shows that considering all 10 aptitude areas, about the same percentage of applicants (on average, 6% and 8%) in the two samples currently attain a score of 90 and would not under the experimental conversions. The largest impact is in the SC area, where the experimental table shows losses of 10%-18% from what the operational table yields; second and third largest are in OF and CO, followed by GM.

Table 3 presents comparisons of the two sets of conversions by aptitude area, at score levels of 80, 90, 95, 100, and 110. Specifically, the table shows the consequence of applying the operational conversion and the experimental conversion, as well as the consequences of using the ACB-73 conversion for Sample 1. (ACB-73 scores were not available for the applicants in Sample 2.) For both samples, the ASVAB experimental conversion results in fewer school-qualified men than the ASVAB operational table in every area at almost every score level shown.

The findings with regard to the ACB-73 conversions are less clear. For five of the ten composite scores, the ACB-73 distribution resulted in even fewer qualified men than either the ASVAB experimental or operational conversion tables. For the other five areas, the differences between ACB-73 and the alternatives are very small, and mixed. However, as the ACB-73 was replaced in the AFEES by ASVAB 6 and 7 as of 1 January 1976, these comparisons are primarily of historic interest.

CONCLUSIONS

Based on these samples, very few successful Army applicants qualify for enlistment with only one AA score of 90 or higher. Even in the larger January 1976 sample, too few such men were present for statistical analysis.

Analysis of data for men with two or more AA scores of at least 90 shows that the percentage of men qualified for enlistment is independent of whether the ASVAB operational or experimental conversion table is used. That is, either set of conversions would qualify about the same percentage of Army applicants.

This is not the case when considering school eligibility. Specifically, the ASVAB experimental conversion is "harder," in that fewer men would qualify for each AIT school, on the average 6% to 8% fewer. Thus, acceptance by the Army of this experimental conversion as a replacement for the currently operational one would have a negative impact on the classification and school assignment of enlisted men.

Table 3

EFFECTS OF ALTERNATIVE NORMS ON SCHOOL-ELIGIBLE ARMY RECRUIT SAMPLES, BY APTITUDE AREAS
(Page 1 of 5)

Minimum Score	ASVAB Operational	ACB-73	ASVAB Experimental	Net Difference	Percent Change
	Aptitude Area: Combat (CO)				
	Number of Recruits with Minimum Score				
Sample 1: N=359	(1)	(2)	(3)	(1)-(3)	(1)-(3)
80	350	336	307	-43	-12
90	307	302	271	-36	-12
95	256	266	222	-34	-13
100	211	209	168	-43	-20
110	127	124	99	-28	-22
Sample 2: N=629					
80	615		570	-45	- 7
90	570		518	-52	- 9
95	504		451	-53	-11
100	438		368	-70	-16
110	299		233	-66	-22
	Aptitude Area: Field Artillery (FA)				
Sample 1: N=359	(1)	(2)	(3)	(1)-(3)	(1)-(3)
80	339	329	323	-16	- 5
90	290	284	278	-12	- 4
95	249	217	238	-11	- 4
100	187	164	187	0	0
110	107	84	107	0	0
Sample 2: N=629					
80	603		583	-20	- 3
90	557		533	-24	- 4
95	498		482	-16	- 3
100	421		421	0	0
110	289		289	0	0

Table 3 (Page 2 of 5)

Minimum Score	ASVAB Operational	ACB-73 Obsolete	ASVAB Experimental	Net Difference	Percent Change
Aptitude Area: Electronics (EL)					
	Number of Recruits with Minimum Score				
Sample 1: N=359	(1)	(2)	(3)	(1)-(3)	(1)-(3)
80	349	327	333	-13	- 4
90	313	285	294	-19	- 6
95	274	248	252	-22	- 8
100	221	193	201	-20	- 9
110	139	122	139	0	0
Sample 2: N=629					
80	619		603	-16	- 3
90	582		560	-22	- 4
95	524		480	-44	- 8
100	441		421	-20	- 5
110	322		322	0	0
Aptitude Area: Operators and Food Handlers (OF)					
Sample 1: N=359	(1)	(2)	(3)	(1)-(3)	(1)-(3)
80	335	298	314	-21	- 6
90	303	237	260	-43	-14
95	237	203	203	0	0
100	207	177	191	-16	- 8
110	136	113	122	-14	-10
Sample 2: N=629					
80	601		575	-26	- 4
90	555		511	-44	- 8
95	485		485	0	0
100	419		385	-34	- 8
110	305		271	-34	-11

Table 3 (Page 3 of 5)

Minimum Score	ASVAB Operational	ACB-73 Obsolete	ASVAB Experimental	Net Difference	Percent Change
	Aptitude Area: Surveillance & Communications (SC)				
	Number of Recruits with Minimum Score				
Sample 1: N=359	(1)	(2)	(3)	(1)-(3)	(1)-(3)
80	354	335	321	-33	- 9
90	305	301	251	-54	-18
95	241	234	205	-36	-15
100	186	161	156	-30	-16
110	113	91	105	- 8	- 7
Sample 2 N=629					
80	618		573	-45	- 7
90	552		499	-53	-10
95	485		439	-46	- 9
100	421		353	-68	-16
110	262		246	-16	- 6
	Aptitude Area: Mechanical Maintenance (MM)				
Sample 1: N=359	(1)	(2)	(3)	(1)-(3)	(1)-(3)
80	339	324	317	-22	- 7
90	303	275	383	-20	- 7
95	268	236	245	-23	- 9
100	210	190	194	-16	- 8
110	130	112	126	- 4	- 3
Sample 2 N=629					
80	608		581	-27	- 4
90	565		537	-28	- 5
95	511		485	-26	- 5
100	442		412	-30	- 7
110	298		277	-21	- 7

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Aptitude Area: General Maintenance (GM)
Number of Recruits with Minimum Score

Minimum Score	ASVAB Operational	ACB-73 Obsolete	ASVAB Experimental	Net Difference	Percent Change
Sample 1: N=359	(1)	(2)	(3)	(1)-(3)	(1)-(3)
80	351	339	328	-23	- 7
90	321	292	291	-30	- 9
95	291	239	298	-53	-18
100	226	191	186	-40	-18
110	136	104	121	-15	-11
Sample 2 N=629					
80	619		593	-26	- 4
90	583		542	-41	- 7
95	542		485	-57	-11
100	473		403	-70	-15
110	316		265	-51	-16

Aptitude Area: Clerical (CL)

Sample 1: N=359	(1)	(2)	(3)	(1)-(3)	(1)-(3)
80	347	352	337	-10	- 3
90	293	329	283	-10	- 3
95	249	265	249	0	0
100	201	208	179	-22	-11
110	114	115	105	- 9	- 8
Sample 2 N=629					
80	602		585	-17	- 3
90	538		517	-21	- 4
95	477		477	0	0
100	401		386	-15	- 4
110	281		262	-19	- 7

Table 3 (Page 5 of 5)

Minimum Score	ASVAB Operational	ACB-73 Obsolete	ASVAB Experimental	Net Difference	Percent Change
Aptitude Area: Skilled Technical (ST)					
	Number of Recruits with Minimum Score				
Sample 1: N=359	(1)	(2)	(3)	(1)-(3)	(1)-(3)
80	348	333	329	-19	- 5
90	310	285	299	-11	- 4
95	381	235	263	-18	- 6
100	227	191	184	-43	-19
110	121	96	108	-13	-11
Sample 2: N=629					
80	613		600	-13	- 2
90	566		548	-18	- 3
95	531		506	-25	- 5
100	463		415	-48	-10
110	305		283	-22	- 7
Aptitude Area: General Technical (GT)					
Sample 1: N=359	(1)	(2)	(3)	(1)-(3)	(1)-(3)
80	353	344	328	-25	- 7
90	289	300	278	-11	- 4
95	244	232	228	-16	- 7
100	186	179	174	-12	- 6
110	106	94	102	- 4	- 4
Sample 2: N=629					
80	618		581	-37	- 6
90	552		532	-20	- 4
95	493		469	-24	- 5
100	397		377	-20	- 5
110	282		265	-17	- 6